

PROSIMULIUM ESSELBAUGHI N. SP., THE ALASKAN *P. HIRTIPES* 2

(DIPTERA: SIMULIIDAE)

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Cytological studies in the Botany Department at the University of Toronto by Drs. Rothfels and Basrur, as well as improved preservation and rearing techniques, more detailed morphological studies of larvae, pupae, males and females, and additional information on habitat and bionomics, have all contributed to the realization that *Prosimulium hirtipes* (Fries) of authors actually involves a complex of species. The *P. hirtipes* 2 of Rothfels (1956) was later named *P. mixtum* S. & D. Lewis Davies (1957), Syme and D. Davies (1958) and Sommerman (1958, 1962) respectively, referred to one entity of this *hirtipes* complex as *P. hirtipes* (Alaska), Alaskan *P. mixtum* and Alaskan *P. hirtipes* 2. Some of the earlier Alaskan records of *P. hirtipes* (Fries), such as those given in the comprehensive papers by Stone (1952), Sommerman (1953) and Sommerman *et al* (1955) refer in part to this species, which is of particular interest because it is known to bite humans here in Alaska. The following description and definition are presented to clarify the species concept and facilitate future reference to it.

I am especially grateful to Drs. M. Wood and D. Davies for providing specimens of *P. mixtum* for study. Also, the descriptions and illustrations in the references listed have been of tremendous value in defining this species.

Descriptive comments refer to alcoholic specimens. Adults were reared from pupae as described by Sommerman (1956). Reared adults allowed to live only a day or two are not completely pigmented so the basal antennal segments and pattern on femora and tibiae etc. are pale brown, instead of darker brown as in older specimens. Light source and direction of light are critical in determining the color of the overall vestiture, therefore the head is directed toward the light source for all color comments except those referring to the terminalia, ventral view, which are also directed toward the light source. An incandescent not a fluorescent bulb was used with a stereoscopic microscope.

***Prosimulium esselbaughi*, new species**

Prosimulium esselbaughi is named in honor of the late Charles O. Esselbaugh, who gave so unstintingly of his time while participating in the biological studies conducted by the Alaska Insect Project in the summer of 1948. His pertinent notes and keen observations during the collecting, rearing, and initial sorting of all stages of black flies taken in the Fairbanks area greatly simplified the task of identifying the specimens and organizing and analyzing the data.

All type specimens were individually reared from pupae and each is accompanied by the pupal exuviae and case. The larval head capsule

also accompanies a few. The pupae of the types were all collected by the author at Station 272 on Fort Richardson, Alaska, between May 17 and July 16, 1956 to 1959. For habitat description see Sommerman *et al* (1955). *HOLOTYPE*: Female, Fort Richardson, Alaska, Sta. 272, July 14, 1959. *ALLOTYPE*: Male, (same data as holotype). *PARATYPES*: 21 males 13 females. The holotype, allotype, and 7 male and 5 female paratypes, are deposited in the collection at the United States National Museum. In addition, 7 male paratypes and 4 female paratypes are deposited in the Canadian National Collection as well as at the Illinois Natural History Survey. Larvae and pupae from the type locality and additional larvae, pupae, and reared specimens from another typical habitat are also deposited in the above-mentioned collections.

Female.—General color brown (dark brown in aged specimens) and beige, with blond and brownish black vestiture. Wing length 3.5 to 4.2 mm. Head brown, setae blond; frons and clypeus brown. Antennae with eleven segments, the first and second brown like clypeus, the second widest, and remaining ones tapering and with light pile. Last segment of palps longer than sensory segment; sensory organ usually with large opening, about equal to width of organ. Mandibles serrate, maxillae with retrorse teeth. Pronotum, scutum and post scutellum brown, the first two with blond vestiture; scutellum beige to pale brown (like tibiae) with erect long blond hairs. Pleuron mostly brown and beige with a purple hue to the membranous areas near the spiracles especially. Mesosternum brown. Setae on base of costa mixed brownish and blond, on stem vein blond. Legs beige and brown as follows:—forecoxae brown with continuous rectangular beige patch on anterior and median surface; all femora beige to pale brown with narrow distal brown band at tip; tibiae beige to pale brown with narrow proximal and distal brown band; tarsi brown. Claws without teeth. Membranous portion of abdomen with purple hue especially posteriorly; tergites mottled beige and brown, less mottled and darker posteriorly; fourth tergite about as wide as scutellum; the whole abdomen covered with fine blond pubescence. No sclerotized sternal plates cephalad of seventh sternite; anterior gonapophyses shorter than last segment of palps, and with an oblique bend about midway, tips somewhat rounded or bluntly tapered, pigmentation and sclerotization along the mesad margin for the most part not extending much beyond the anterior half in young adults, but in more aged specimens brownish sclerotization extends almost to tip.

Male.—General color brown to dark brown, with vestiture blond and blackish brown. Head dark brown; two basal segments of antennae darkest, second segment widest, third narrower but almost as long as second; sensory organ of palps with rather wide opening; last segment of palps longer than sensory segment; scutellum light brown to brown, but lighter than scutum and post scutellum which are brown to dark brown. Wing length 3.8 to 4.4 mm; setae on base of costa mostly blond, on stem vein blond. Ventral plate with tip of lip slightly concave and rounded.

Pupa.—The preserved pupa is 3.5 to 5.0 mm long, exclusive of the respiratory organ, which is usually lighter in color than dorsum of thorax of exuviae. The trunk of the respiratory organ supports three branches. The anterior and laterad branches each terminate in four filaments and the dorsal branch has eight, making a total of sixteen filaments per organ. The dorsal and laterad branches are somewhat unidirectional, so from side view, 'L1' tends to 'obscure' 'D1.' 'L1' is usually longer than 'D1' or 'A1', and 'D2.3' is often much shorter than 'L1'. The pupal case is dense but rather

loosely assembled, generally with only the respiratory organ exposed, but sometimes the entire top of the thorax is bare.

Larva.—The mature preserved larva is 7.0 to 8.5 mm long, with the head capsule light brownish yellow and the rest of the body smoky. The dorsal head pattern usually consists of a slightly darker median spot about opposite the upper end of the mandibular phragma, accompanied by two smaller less distinct lateral spots behind the median spot and about half way to the sutures. Sometimes there is a slight indication of a median posterior spot. The capsule is darker (but not banded) along the posterior margin. The throat cleft is rather shallow and rounded at the corners, with an indistinct "dash" and "dot", on each side before the tentorial pits. The terminal lateral submental teeth are not quite so high as the tip of the median tooth; the other lateral teeth are below the tips of secondary teeth on median tooth. The mouth fan contains 20 to 28 rays.

Under the name *P. hirtipes* and *P. hirtipes* 2, *esselbaughi* was distinguished from *doveri* Sommi., *frohnei* Sommi., *fulvum* (Coq.) and *travisi* Stone by Sommerman (1953, 1958, 1962). According to Rothfels (correspondence) further study of salivary gland chromosome patterns of mature larvae indicate *esselbaughi* is more closely related to the preceding four Alaskan species than it is to *mixtum*.

The following characters of *mixtum* differentiate it from *esselbaughi*. Both sexes are generally darker and more robust; antennae tapering from third segment; last segment of palps about as long as sensory segment. In addition, the female has the two basal antennal segments lighter than the rest; abdominal tergites less mottled and darker; anterior gonapophyses rather flat, long and tapering, about as long as last segment of palps, with median sclerotization extending far into posterior half. Male ventral plate with lip tapering to an attenuated carina. Pupal respiratory organ with lateral branch directed somewhat anteriorly, so from side view, L1 tends to obscure A1; A1 is usually longer than L1 or D1; D2.3 is much longer than L1. For terminology of the respiratory organ see Sommerman (1962). The larval head pattern is more complex, consisting dorsally of four "dots" and four "dashes", the latter in the form of a median inverted "T", the stem and cross-bar of which are each composed of two "dashes", end to end. One pair of "dots" (lateral spots) is about opposite the break in the stem, and the second pair of spots is behind the first. The throat cleft is shallow, with a "dash" and a "dot" on each side before the tentorial pit. The tips of the lateral submental teeth are all above height of secondary teeth on side of median tooth. The mouth fan contains 33 rays. Excellent illustrations of *mixtum* are given by Stone (1964).

The *P. esselbaughi* examined during this study were all collected within fifty miles of Anchorage. Larvae and pupae has been found in cold, permanent streams, from a little above timberline to sea level. Streams where specimens were taken were 3 to 25 feet wide, 4 to 18 inches deep, with speeds from 2.5 to 4.5 feet per second to tumbling. But *esselbaughi* was the dominant black fly species (in terms of population density) only in clear, cold, permanent, spring-fed, forest streams, 3 to 4 feet wide, 1 to 4 inches deep, flowing 3 to 4 feet per second; with little fluc-

tuation in depth and maximum stream temperatures ranging from 40 to 45° F while larvae and pupae were present. It is assumed such is the typical or preferred habitat of *esselbaughi*, and there *fulvum*, and sometimes also *Eusimulium pugetense* (D. & S.) were relatively abundant and in direct association with *esselbaughi*, though they pupated and emerged a bit earlier.

P. esselbaughi has but one generation a year, with larvae overwintering. The following information was obtained from populations in the typical habitats only. Hatching apparently started in late August and early September. The larvae usually attached to the deflecting surfaces of rocks and the under surface of loose stones in riffles, or to large roots that formed the brink of falls. Larval development required about nine months, mature larvae becoming abundant the latter half of May and the first week of June when the stream temperatures were 38 to 39° F. At this time of year, however, before the leaves are out, the stream temperatures fluctuate considerably through out a twenty-four hour period on a clear day. The larvae often pupate in groups forming patches of silken cases attached to the under surfaces of loose stones, as well as in niches and cracks on the deflecting surfaces of any rocks. Pupae were present from late May to mid-July and were most numerous during the last three weeks of June. Most of the adults emerged during the latter half of June and early July, with the males starting to emerge slightly before the females, as usual.

A few adults that emerged in the lab from pupae collected in the streams, were kept in cubic inch plastic emergence cages described by Sommerman (1956). The adults had access to water from the cotton-filled tubes supporting the pupa, and a few grains of dextrose were put in the cage the day after emergence. The adults discovered them quickly and appeared to feed. The females survived 10 to 13 days and contained well-developed eggs; males survived up to 14 days. Several females deposited a few eggs on the wet cotton and pupal cases in their cages. Other adults had access to maple syrup on the lid and some of those survived 12 to 14 days; the females also contained well-developed eggs. Most of these females were given an opportunity to bite me on one or more occasions, but none did,—their chief interest seeming to be escape. This species was more active and could cling to the cages more tightly and dart out much more quickly than *fulvum*, *doveri*, *frohnei*, or *trivisi*.

Females were attracted to me at the typical habitats from mid-June to mid-July, from about sunset throughout the twilight hours, which lasted through the night during much of that period. They often landed and probed but did not bite readily. However, these same wild-caught specimens did bite readily in captivity but laboratory conditions were unsatisfactory for survival at that time and all died within three days. They usually fed three to four minutes and left an oozing drop of blood; a welt developed shortly thereafter which itched and burned for several days.

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SOME TARSONEMIDAE FROM THE REPUBLIC OF THE CONGO

(ACARINA)

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Very little is known about the tarsonemid mites of Africa, even though some are of economic importance. Being small and inconspicuous, few tarsonemids are collected, and so it is with some interest that mites belonging to this family were collected by E. W. Baker during a trip to the Congo in 1955. In the collection are undescribed species belonging to the genera *Tarsonemus* Canestrini and Fanzago, *Stencotarsonemus* Beer, and *Hemitarsonemus* Ewing. Known species of *Tarsonemus* and *Fungitarsonemus* were also found.

***Tarsonemus cromroyi*, new species**

(Figs. 1-7)

This species is characterized by the presence of an extremely long rodlike solenidion on tarsus I and II of both sexes.

Male. Dorsal body setae short, strong, as figured; third pair of propodosomals longest, only slightly longer than second pair; second pair slightly longer than first